

November 19, 2003
Use Designations for Vortech Inc.'s Vortechs System

Applicant: Vortech Inc.

Applicant Address: 200 Enterprise Drive
Scarborough, ME 04074

Application Documents: Vortechs System Conditional Use Approval Application Letter to the Washington State Department of Ecology (June 25, 2003)

Vortechs Stormwater Treatment System Technology Report, June 2003

Technical Appendices 1 through 16

Applicant's Use Level Request: Conditional Use Designation as a Basic Treatment device in accordance with Ecology's 2001 stormwater manual.

Applicant's Performance Claims: Based on laboratory trials, the Vortechs System will achieve an 80% TSS removal efficiency, for sediment particles ranging from 38 to 75 microns, at an operating rate of 13 gallons per minute per square foot (GPM/sf) at the peak flow for the Ecology design treatment storm.

The system is recommended only for sites likely to produce relatively high TSS concentrations (above 100 mg/L), where TSS is primarily composed of 50 microns and larger. Potentially appropriate sites include parking lots, highways and urban streets, material transfer sites, hydrocarbon transfer sites, retrofits, steep/erosive sites, and space-limited sites.

Ecology's Decision: Based on the applicant's submissions and the Technical Review Committee's (TRC) recommendations (see below), Ecology hereby issues the following use designations for the Vortechs technology:

1. **General Use Level Designation (GULD) for pretreatment use, as defined in the Ecology Manual Volume I, (a) ahead of infiltration treatment, or (b) to protect and extend the maintenance cycle of a Basic or Enhanced Treatment device (e.g., sand or media filter).** This GULD applies to Vortechs units sized at an operating rate of no more than 35 gpm/sf at the Water Quality design flow rate as determined using the Western Washington Hydrology Model (WWHM).
2. **Pilot Use Level Designation (PULD) for oil and grease treatment.** This applies to Vortechs units sized at an operating rate of no more than 13 gpm/sf at the Water

Quality design flow rate as determined using the WWHM. This PULD expires on August 1, 2006 unless extended by Ecology.

3. Properly designed and operated Vortechs systems may also have applicability in other situations (example: low-head situations such as bridges or ferry docks), for TSS and oil/grease removal where, on a case-by-case basis, it is found to be infeasible or impracticable to use any other approved practice. Local jurisdictions should follow established variance or exception procedures in approving such applications.
4. Ecology finds that the Vortechs, sized at an operating rate of 13 GPM/sf, could also provide:
 - Water quality benefits in retrofit situations.
 - The first component in a treatment train.
 - Effective removal of deicing grit/sand.

Ecology's Conditions of Use:

1. Vortechs Systems must be designed, assembled, installed, operated, and maintained in accordance with Vortechtechnics, Inc.'s applicable manuals and documents and the Ecology Decision.
2. On or before December 31, 2003, Vortechtechnics shall submit a QAPP that meets the TAPE requirements for attaining a GULD for oil and grease removal.
3. Local jurisdictions must file a "Pilot Level Technologies Notice of Intent" form with Ecology prior to authorizing Vortechs for a PULD application. All facilities installed under a PULD must monitor oil and grease in accordance with the Ecology-approved QAPP.
4. Vortechtechnics, Inc. shall complete all required testing and submit a TEER for TRC and Ecology review by December 2005.
5. Vortechtechnics, Inc. may request Ecology to grant deadline or expiration date extensions, upon showing cause for such extensions.
6. Discharges from the Vortechs System shall not cause or contribute to water quality standards violations in receiving waters.

Technical Review
Committee's Recommendations
To Ecology:

The TRC finds that:

- The Vortechs system, sized at 13 GPM/sf, should provide, at a minimum, equivalent performance to a presettling basin as defined in *Stormwater Management Manual for Western Washington (August 2001), Volume V, Chapter 6*.

- Vortech Inc. should be given the opportunity to demonstrate, through additional laboratory and field testing, whether the Vortech System can attain Ecology's Basic Treatment performance goal for TSS removal.
- Vortech Inc. should be given the opportunity to demonstrate, through additional laboratory and field testing, whether the Vortech System can attain Ecology's Oil Treatment performance goal.

**Basis for the TRC's
Recommendations:**

1. Laboratory testing was completed by Vortech Inc. for sieved sand using a Vortech Model 2000. Laboratory results for the "50 micron" particle range (included particles ranging from 38 to 75 microns) showed 80% removal at 13 GPM/sf operating rate.
2. Laboratory testing was completed by Vortech Inc. for 10W40 motor oil at 15 to 90 mg/L using a Vortech Model 2000. The system provided about 90% removal at 13 GPM/sf operating rate.
3. Abbreviated laboratory testing was completed by Vortech Inc. for Sil-Co-Sil 106, a ground silica product with a mean particle size of about 20 microns. Removal rates at 5 to 10 GPM/sf were around 40%.
4. Various field studies were completed by independent parties in the eastern and northeastern United States (Lake George, NY; South Windsor, CT; Yarmouth, ME; Harding Township, NJ; Lexington, MA; Burlington, VT; and Charlottesville, VA). Study details are provided in the technical appendices. These studies generally show above 80% TSS removal rates. However, the results from a particle size distribution analysis on sediment captured in the Lake George Vortech System indicate that mainly coarse particles were present. Because the influent particle size distribution was not measured removal efficiency of specific particle sizes could not be determined.
5. Three field studies were completed by independent parties in the Pacific Northwest (WSDOT SR-405; Buffalo Slough/City of Portland; Unified Sewerage Agency, Oregon). Study details were not included in Vortech submissions. These studies generally show TSS removal rates significantly below Ecology's Basic Treatment goals. Vortech questions the studies' apparent inconsistencies and sampling errors.
6. The system is easily maintained using a vacuum truck.
7. There are over 2500 and 100 Vortech systems installed nationwide and in the Pacific Northwest, respectively.

**Other Vortechs-Related
Issues to be Addressed
By the Company:**

1. Design of future facilities must verify that effective vertical hydraulic oil rise rates (the generally accepted rate is 0.033 feet per minute) can be achieved within the separation chamber.
2. Field testing to-date suggests that the Vortechs System cannot reliably attain 80% removal of the finer particles comprising TSS found on local highways, parking lots, and other high-use areas. Design of future facilities should consider:
 - a. a flow diverter,
 - b. reducing the design velocity for small particle applications,
 - c. testing the system in conjunction with a filter as part of a treatment train,
 - d. deepening or modifying the sediment sump, or other design features as needed to prevent resuspension of settled solids.
 - e. laboratory re-testing with Sil-Co-Sil 106, after modifying the system to reduce resuspension (for example, retrofitting with a deeper sump).

Technology Description:

CD-ROM of Vortechs System Technology Report, dated June 2003, may be requested from Vortechtechnics, Inc.

Design Manual and technical bulletins can be downloaded from company's web site.

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